

A. Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

Claims 1-15 (Cancelled).

16(New). A method of creating a composition of matter with one or more modified properties comprising:

selecting a metal compound comprising at least one metal and at least one element selected from the group consisting of: C, O, N, B, S, H, Se, Te, In, Sb, Al, Ni, F, P, Cl, Br, I, Si, and Ge;

creating a nanoscale powder form of a substance comprising the metal compound wherein at least one additional element is combined to the lattice of the metal compound thereby creating a compound comprising three or more elements;

wherein the act of combining at least one additional element to the lattice of the metal compound modifies at least one property of the metal compound; and

the nanoscale powder form of the substance is substantially compositionally uniform.

17(New). The method of claim 16 wherein the at least one metal in the metal compound is selected from the group consisting of Ti, Mn, Fe, Ni, Zn, Cu, Sr, Y, Zr, Ta, W, Sc, V, Co, In, Li, Hf, Nb, Mo, Sn, Sb, Al, Ce, Pr, Be, Np, Pa, Gd, Dy, Os, Pt, Pd, Ag, Eu, Er, Yb, Ba, Ga, Cs, Na, K, Mg, Pm, Pr, Ni, Bi, Tl, Ir, Rb, Ca, La, Ac, Re, Hg, Cd, As, Th, Nd, Tb, Md, and Au.

18(New). The method of claim 16 wherein the additional element is combined to the lattice in a concentration greater than 1%.

19(New). The method of claim 16 wherein the property is selected from the group consisting of: electrical conductivity, dielectric constant, dielectric strength, dielectric loss, polarization, permittivity, critical current, superconductivity, piezoelectricity, mean free path, curie temperature, critical magnetic field, permeability, coercive force, magnetostriction, magnetoresistance, hall coefficient, BHmax, critical temperature, melting point, boiling point, sublimation point, phase transformation condition, vapor pressure, anisotropy, adhesion, density, hardness, ductility, elasticity, porosity, strength, toughness, surface roughness, coefficient of thermal expansion, thermal conductivity, specific heat, latent heat, refractive index, absorptivity, emissivity, dispersivity, scattering, polarization, acidity, basicity, reactivity, energy density, activation energy, free energy, entropy, frequency factor, bioactivity, biocompatibility, thermal coefficient of any property and pressure coefficient of any property.

20(New). The method of claim 16 wherein the act of creating a nanoscale powder comprises one or more of steps selected from the group consisting of: heating in inert atmosphere, heating in oxidizing atmosphere and heating in reducing atmosphere.

21(New). The method of claim 16 wherein the act of creating a nanoscale powder further modifies one or more of the following characteristics of the nanoscale powders: shape, surface area, morphology, surface characteristics, surface composition, size distribution and degree of agglomeration.

22(New). The method of claim 16 wherein the act of creating a nanoscale powder comprises plasma processing.

23(New). The method of claim 16 wherein the act of creating a nanoscale powder comprises a quench step.

24(New). The method of claim 16 wherein the additional element has a valency different than at least one metal in the metal compound.

25(New). The method of claim 16 wherein the nanoscale powder has an aspect ratio greater than 1.

26(New). A method of creating a composition of matter comprising:
selecting a metal compound comprising at least one metal and at least one element selected from the group consisting of: C, O, N, B, S, H, Se, Te, In, Sb, Al, Ni, F, P, Cl, Br, I, Si, and Ge;

creating a nanoscale powder form of a substance comprising the metal compound wherein at least one additional element is combined to the lattice of the metal compound thereby creating a compound comprising three or more elements;

wherein the act of combining at least one additional element to the lattice of the metal compound modifies at least one property of the metal compound; and

the nanoscale powder form of the substance exhibits a gradient composition.

27(New). The method of claim 26 wherein the at least one metal in the metal compound is selected from the group consisting of Ti, Mn, Fe, Ni, Zn, Cu, Sr, Y, Zr, Ta, W, Sc, V, Co, In, Li, Hf, Nb, Mo, Sn, Sb, Al, Ce, Pr, Be, Np, Pa, Gd, Dy, Os, Pt, Pd, Ag, Eu, Er, Yb, Ba, Ga, Cs, Na, K, Mg, Pm, Pr, Ni, Bi, Tl, Ir, Rb, Ca, La, Ac, Re, Hg, Cd, As, Th, Nd, Tb, Md, and Au.

28(New). The method of claim 26 wherein the additional element is combined to the lattice in a concentration greater than 1%.

29(New). The method of claim 26 wherein the property is selected from the group consisting of: electrical conductivity, dielectric constant, dielectric strength, dielectric loss, polarization, permittivity, critical current, superconductivity, piezoelectricity, mean free path, curie temperature, critical

magnetic field, permeability, coercive force, magnetostriction, magnetoresistance, hall coefficient, BHmax, critical temperature, melting point, boiling point, sublimation point, phase transformation condition, vapor pressure, anisotropy, adhesion, density, hardness, ductility, elasticity, porosity, strength, toughness, surface roughness, coefficient of thermal expansion, thermal conductivity, specific heat, latent heat, refractive index, absorptivity, emissivity, dispersivity, scattering, polarization, acidity, basicity, reactivity, energy density, activation energy, free energy, entropy, frequency factor, bioactivity, biocompatibility, thermal coefficient of any property and pressure coefficient of any property.

30(New). The method of claim 26 wherein the act of creating a nanoscale powder comprises one or more of steps selected from the group consisting of heating in inert atmosphere, heating in oxidizing atmosphere and heating in reducing atmosphere.

31(New). The method of claim 26 wherein the act of creating a nanoscale powder comprises a combustion step.

32(New). The method of claim 26 wherein the act of creating a nanoscale powder comprises plasma processing.

33(New). The method of claim 26 wherein the act of creating a nanoscale powder comprises a quench step.

34(New). The method of claim 26 wherein the additional element has a valency different than at least one metal in the metal compound.

35(New). The method of claim 26 wherein the nanoscale powder has an aspect ratio greater than 1.

36(New). A product comprising the nanoscale powders prepared using the method of claim 16.

37(New). A product comprising the nanoscale powders prepared using the method of claim 26.

38(New). The method of claim 26 wherein the nanoscale powders are stoichiometric.

39(New). The method of claim 26 wherein the nanoscale powders are non-stoichiometric.

40(New). The method of claim 26 wherein the act of creating a nanoscale powder further modifies one or more of the following characteristics of the nanoscale powders: shape, surface area, morphology, surface characteristics, surface composition, size distribution and degree of agglomeration.

41(New). A composition of matter comprising a nanoscale material wherein

the domain size of the material is less than 250 nanometers;

the composition of the material is non-stoichiometric;

the composition of the material is substantially uniform at the lattice level;

and

the relative ratios of elements in the composition of the material differ by more than 1% from stoichiometric values.

42(New). The composition of matter of claim 41 wherein the composition of the material comprises oxygen.

43(New). The composition of matter of claim 41 wherein the composition of the material comprises nitrogen.

44(New). The composition of matter of claim 41 wherein the composition of the material comprises boron.

45(New). The composition of matter of claim 41 wherein the composition of the material comprises carbon.

46(New). The composition of matter of claim 41 wherein the composition of the material comprises chalcogenides.

47(New). The composition of matter of claim 41 wherein the composition of the material comprises halide.

48(New). The composition of matter of claim 41 wherein the composition of the material comprises two or more metals.

49(New). A coating comprising the composition of matter of claim 41.

50(New). A product comprising the composition of matter of claim 41.

51(New). An ink comprising the composition of matter of claim 41.

52(New). The composition of matter of claim 41 wherein the domain size of the material is less than 100 nanometers.